

Report on the Comatulæ of the Mergui Archipelago, collected for the Trustees of the Indian Museum, Calcutta, by Dr. John Anderson, F.R.S., Superintendent of the Museum. By P. HERBERT CARPENTER, D.Sc., F.R.S., F.L.S., Assistant Master at Eton College.

[Read 21st June, 1888.]

(PLATES XXVI. & XXVII.)

THE Comatulæ collected by Dr. Anderson at Mergui were all obtained at one locality, King Island. Most of them belong to the genus *Antedon*, two species of which are represented by five and by twelve examples respectively; while there are three other individuals belonging to as many different species, one of which is new to science. The genus *Actinometra* is represented by three examples of a new and remarkable type, which I found to be the host of a parasitic *Myzostoma*. Three of the species of *Antedon* were similarly infested; and the *Myzostoma*-species found on them have been placed in the hands of Professor von Graff for identification and description.

The following list contains the names and specific formulæ of the Mergui Comatulæ, which are classified on the principles set forth in the Report on the Comatulæ dredged by the 'Challenger'*.

Genus ANTEDON, de Fremenville.

Series I.

Elegans-group.

A. Andersoni, sp. n. A. R. 2. 2. 2. 2. $\frac{bc}{c}$.

A. elegans, Bell. A. R. 3. 2. (2). $\frac{b}{c}$.

Series II.

Milberti-group.

A. Milberti, Müll., sp. A. $\frac{b}{\delta}$.

* Zool. 'Challenger' Exped., part lx., 1888.

Series III.

Palmata-group.

- A. spicata*, Carpenter. A. 2. 2. (2). $\frac{bc}{b}$.
A. conjungens, Carpenter. A. 2. 2. 2. $\frac{b}{b}$.

Genus ACTINOMETRA, Müller.

Series I.

Paucicirra-group.

- A. notata*, sp. n. a. R. $\frac{d. p. p' (p''). br.}{2} \frac{bc}{b}$.

Description of the Specimens.

ANTEDON ELEGANS, Bell.

Specific Formula. A. R. 3. 2. (2). $\frac{b}{c}$.

1882. *Antedon elegans*, Bell, *Proc. Zool. Soc. Lond.* 1882, p. 534.

1882. *Antedon elegans*, Carpenter, *Proc. Zool. Soc. Lond.* 1882, pp. 746, 747.

1884. *Antedon elegans*, Bell, *Rep. Zool. Coll. H.M.S. 'Alert,' Lond.* 1884, p. 162, pl. xiii. figs. B, B a.

1888. *Antedon fluctuans* (*elegans*), Carpenter, *Zool. 'Chall.' Exped.* part ix. 1888, pp. 94, 264, pl. viii.

Habitat. King Island. Five specimens. Two of them "sub-littoral;" two "on corals;" one with the cirri coiled round a Gorgoniid.

Remarks. This species was first described by Bell in the 'Alert' Report. But he overlooked its most important character, the syzygial union of the two outer radials. Three examples of it were dredged by the 'Challenger,' and were described by myself as *Antedon fluctuans*; for I was then in ignorance of the real character of *A. elegans*. This I only discovered subsequently, when examining Bell's type for the purpose of determining its relation to the other tridistichate species of *Antedon* with articulated radials. The sheet containing the description of *A. fluctuans* had then been printed off, and the plate lettered with this name; but a note was inserted further on in the Report* to point out the identity of *A. fluctuans* with *A. elegans*, Bell; and the latter name was used both in the classified list of *Antedon-*

* *Zool. 'Challenger' Exped.* part ix., 1888, p. 264.

species on p. 53 and in the distribution-lists at the end of the Report.

The five examples of *A. elegans* from Mergui are mostly larger than those obtained by the 'Challenger' and 'Alert' in the Arafura Sea and Torres Strait respectively. The arms of the largest one reach 10 centim. in length, and their earlier joints are relatively shorter, with a more wedge-shaped outline and a greater tendency to overlap than is visible in the 'Challenger' specimens. The number of arms is small, however, rarely exceeding thirty; for the post-palmar series which occur in three of the four individuals obtained by the 'Challenger' are not present at all in those from Mergui; and the full complement of palmar series is rarely found on any ray. As a rule, only the two inner series are present; so that there are six arms to the ray, viz. 1, 2, 2, 1, as in *A. spinifera*; while the distichal axillaries are sometimes altogether absent. Both these conditions are well shown in the specimen figured by Bell. On the other hand, the Mergui forms show but little tendency to any variation from the type of two palmars, such as occurs in Bell's specimen and in one of those obtained by the 'Challenger.'

The rays of the latter are quite free laterally; but those of the largest specimen from Mergui are more closely in contact, and the distichal joints sometimes exhibit a tendency to the straight-edged and wall-sided character which is so marked in many deep-sea Comatulæ. This is much more distinct in the Philippine variety of *A. elegans*, which I hope to describe shortly together with the other Comatulæ obtained by Professor Semper in the same locality.

All the Mergui specimens are much more darkly coloured than those obtained by the 'Challenger' and 'Alert,' two of them being almost black; another is a dark reddish brown, mottled with lighter patches; and one has a more uniform lighter shade of the same colour. The youngest individual has its cirri coiled round a Gorgoniid (*Plexaura*) of the same dark reddish-brown colour as itself; while a *Myzostoma* infesting one of the two blacker specimens is as darkly coloured as its host.

ANTEDON ANDERSONI, sp. n. (Plate XXVI. figs. 1-5; Plate XXVII. fig. 8.)

Specific Formula. A. R. 2. 2. 2. 2. $\frac{bc}{c}$.

Description of an Individual. Centro-dorsal a thick disk, bearing about forty cirri, which reach 60 millim. in length. They consist of 60-70 tolerably uniform joints, the distal halves of which have sharp spines. First radials partially visible; the second and third narrow, strongly convex, and united by syzygy. The rays are quite free laterally, and divide four or five times; each series of two articulated joints, the first nearly square, and the axillary pentagonal, often as long or longer than wide. All these joints are relatively deep and narrow, with a strongly rounded dorsal surface.

Arms very numerous, fifteen or eighteen to the ray, with compressed joints, the lower ones oblong, and their successors more unequally quadrate. A syzygy in the third brachial, with others following at very uncertain intervals (5-13 joints); but they are apparently altogether absent in some arms.

The first pinnule (on 2nd brachial) is slender and tapering, consisting of 35 or more elongated joints, and reaching nearly 25 millim. in length. The next few brachials bear quite short pinnules, with only some six or eight joints; and their successors increase slowly in length, but never become specially long.

Disk much incised, and not regularly plated, though the integument is very dense and tough.

Colour very dark, almost black—probably deep purple in life,—with lighter patches on the arms. Sacculi very abundant on the pinnules.

Disk 25 millim.; spread 35 centim.

Habitat. King Island; sublittoral. One specimen and a detached disk.

Remarks. This is a fine species which may be referred for the present to the *Elegans*-group; though it differs from the three members of the group which are at present known in certain essential characters. If other species resembling it should eventually be discovered, it may be useful to establish a second group in Series I. of the *Antedon*-species, and to call it the *Andersoni*-group. The three existing members of the *Elegans*-group are all tridistichate, and have a well-plated disk; whereas *Antedon Andersoni* is bidistichate, and the disk has nothing like the large plates covering the interpalmar areas which occur in *A. multiradiata*, *A. elegans*, and *A. microdiscus*. But, on the other hand, it is very tough and leathery, and the ambulacral grooves are more or less completely closed by the approximation of their

sides. This is also visible in the lower parts of the brachial ambulacra, which are often entirely closed by an irregular alternation of processes from opposite sides (Pl. XXVI. figs. 4, 5). There is, however, no indication either of side-plates or of covering-plates on the pinnule-ambulacra, which are of the usual character. But isolated portions of the brachial ambulacra effervesce strongly with acid, and the perisome would therefore seem to contain a considerable amount of diffused limestone particles which are not concentrated into definite spicules or plates, as in most other Crinoids. This would partly account for the hardness and leathery character of the perisome on the disk.

The condition of the disk and the bidistichate rays are the essential points of difference between *A. Andersoni* and the three existing members of the *Elegans*-group. It resembles, but surpasses them all in the great length of its cirri (Pl. XXVII. fig. 8), and also in the length of the first pinnule; but this pinnule is on the second brachial and not on the second distichal as in the *Elegans*-group, while its successors do not decrease slowly in length, but exhibit a sudden and remarkable diminution in size (Pl. XXVI. fig. 2), that of the third brachial consisting of but half a dozen small joints. The following pinnules increase gradually in length, but never reach any considerable size.

Another characteristic feature of *A. Andersoni* is the convex shape of the joints forming the rays and their subdivisions, and also the lateral compression of the arm-joints. Owing, however, to the rays being so widely separated, there is no trace whatever of that lateral flattening of their bases which is so characteristic of the *Basicurva*, *Spinifera*, and *Granulifera*-groups, and occasionally shows itself also in *A. elegans*. It is very marked in the fossil *A. costata*, for which Walther* has recently proposed to restore the generic name *Solanocrinus*, originally applied to this species by Goldfuss. For he believes that the fossil species which he refers to this genus are devoid of the syzygies in the arms which occur more or less frequently in other Crinoids. He attempts to establish some other characters which would distinguish the genus from *Antedon*—an attempt which he would scarcely have made had he been better acquainted both with the literature of the subject and with the condition of many recent species

* "Untersuchungen über den Bau der Crinoiden, mit besonderer Berücksichtigung der Formen aus dem Solenhofener Schiefer und dem Kelheimer Diceraskalk," Palæontographica, 1886, Bd. xxxii. p. 175.

of *Antedon*, as I have pointed out elsewhere*; and the only character, therefore, on which he can possibly rely for the separation of *Solanocrinus* from *Antedon* is the presence of syzygies in the arms of the latter and their absence in those of the former genus. But the material on which he has founded this generalization seems to me to be altogether insufficient. Few, if any, of his very limited number of specimens have as many as forty arm-joints remaining, and these are rarely in a satisfactory state of preservation; so that it is somewhat rash to speak positively about the total absence of syzygies in the arms of *Solanocrinus*. In fact, I have shown reason to believe that syzygies are present even in some of the arms which are figured and described by Walther as being entirely devoid of them.

On the other hand, *Antedon Andersoni* is remarkable for the rarity of the syzygies in the arms. It was a long time before I could discover any at all, except that in the third brachial. In fact, I did not succeed in finding any in some arms; while in others they are often separated by intervals of ten or a dozen joints. In *A. elegans* and *A. multiradiata* the second syzygy may not be till the fortieth or even the sixtieth brachial, and the intervals between its successors may be fifteen or twenty joints. Were these species in the fossil state, therefore, with only the lowest portions of the arms preserved, and that but badly, it would be easy to overlook the syzygy in the third brachial, and to infer that none were present in the arms at all; though such an inference would not be in accordance with the facts of the case. I cannot but suspect, therefore, that Walther's attempt to establish the absence of syzygies as a diagnostic character of *Solanocrinus* is due partly to a generalization on imperfect material, and partly to an insufficient acquaintance with the variations in the distribution of the syzygies among recent Comatulæ.

Any member of the *Elegans*-group, preserved in the fossil state, would make a fairly good *Solanocrinus*; for each species has a relatively large centro-dorsal, bearing a good number of cirri, with few syzygies between the brachials, but one between the two outer radials. This latter condition certainly occurs in *Solanocrinus costatus*, and probably also in *S. imperialis* and

* "The Generic Position of *Solanocrinus*," Ann. & Mag. Nat. Hist. 1887, ser. 5, vol. xix. pp. 82, 83.

S. gracilis, as I have explained elsewhere* ; and I am inclined to regard these last-mentioned species as the ancestral forms of the existing members of the *Elegans*-group. On the other hand, *Antedon scrobiculata* and *A. aspera*, with a bifascial articulation between the two outer radials, were the Jurassic representatives of the majority of the recent species of *Antedon*, in which the two outer radials are also united by a bifascial joint.

ANTEDON MILBERTI †, *Müll.*, sp. (Plate XXVII. figs. 6, 7.)

Specific Formula. A. $\frac{b}{b}$.

1888. *Antedon milberti*, *Carpenter, Zool. 'Chall.' Exp. part lx. p. 194, pl. xxxv. figs. 4-6.*

A dozen examples of this widely distributed species were obtained at King Island, half of them from mud-flats exposed at spring-tide. They are mostly of a light reddish-brown colour, but one is more yellowish brown, and another is almost white. Most of the larger specimens have the bases of the rays somewhat flattened laterally, as is often the case in this species, and there is a good deal of variation in the relative sizes of the lower pinnules. The fourth pinnule on the side is sometimes considerably shorter than the third, and sometimes nearly equal to it (Pl. XXVII. figs. 6, 7).

This species is infested by a *Myzostoma*, which will be described by Professor von Graff.

ANTEDON SPICATA, *Carpenter.* (Plate XXVII. figs. 3-5.)

Specific Formula. A. 2. 2. (2). $\frac{bc}{b}$.

1881. *Antedon spicata*, *Carpenter, Notes from the Leyden Museum, 1881, vol. iii. p. 190.*

A single individual, which I take to belong to this species, occurred at King Island (sublittoral). But it has rather more cirri than the type specimen at Leyden, and in this respect approaches the allied species *Antedon indica* and *A. tuberculata*, which resemble it in having long and stiff pinnules on the fourth and fifth brachials. In *A. indica*, however, the first pinnule is much smaller than the large second one, as is well shown in Smith's figure ‡, while in *A. spicata* it may nearly equal its suc-

* *Ann. & Mag. Nat. Hist.* 1887, ser. 5, vol. xix. pp. 83-87.

† The bibliography of this species will be found in the 'Challenger' Report.

‡ *Zoology of Rodriguez, Echinodermata: Phil. Trans.* 1879, vol. clxviii. pl. li. fig. 3 b.

cessor in length, though it is far more slender (Pl. XXVII. fig. 3). That of *A. tuberculata* is also short, though stiffer than in the other two forms.

This species approaches *A. spicata*, however, in the character of its third pinnule, which is composed of elongated joints like those of the second, and not of numerous smaller joints as in *A. indica*. In some arms of *A. spicata* this third pinnule is smaller on the outer than on the inner side of the arm, *i. e.* the pinnule on the seventh is larger than that on the sixth brachial (Pl. XXVII. fig. 3). But the component joints of these large and stiff pinnules have not the extreme length which they reach in *A. tuberculata*; and the characters of this Mergui example of *A. spicata* confirm my separation of this species from *A. tuberculata*; for the latter has but twelve joints in a second pinnule which reaches 15 millim. long, while in the former species a pinnule of the same length consists of sixteen joints or more. In both alike, however, the rays have marginal projections which seem to be absent in *A. indica*. But the cirri of *A. tuberculata* are stouter, though with a somewhat smaller number of joints than occur in *A. spicata* (Pl. XXVII. fig. 4). The type specimen of the latter has no post-palmar axillary, but one occurs in the Mergui example, which necessitates the addition of a 2 (in brackets) to the specific formula.

ANTEDON CONJUNGENS, *Carpenter*. (Plate XXVII. figs. 1, 2.)

Specific Formula. A. 2. 2. 2. $\frac{b}{b}$.

1888. *Antedon conjungens*, *Carpenter*, *Zool. 'Chall.' Exp.* part lx. p. 233, pl. xlv. fig. 1.

One mutilated individual which seems to belong to this species was obtained at King Island (sublittoral). Like the other Comatulæ from this locality it is very darkly coloured, while the two specimens found by the 'Challenger' on the Zebu Reefs are light grey, with occasional dark patches, and the margins of the lower parts of the rays are more produced towards the ventral side than is the case in the Mergui form. The characters of the cirri and of the arm-divisions are, however, the same in both; and the pinnule-arrangement is also generally similar in the two types. The largest pinnule is on the fourth brachial, and it is much larger on the outer than on the inner arm of each distichium; in the former case the pinnule on the second brachial is also of con-

siderable size, but on the inner arms it is a good deal smaller (Pl. XXVII. figs. 1, 2).

The chief point of difference between the Mergui and the Philippine specimens is in the size of the third pinnule, that on the sixth brachial. In the outer arms of the Mergui individual (Pl. XXVII. fig. 1) its length relatively to that of its predecessor on the fourth brachial is but little smaller than in the type-specimens from Zebu; but on the inner arms (Pl. XXVII. fig. 2) the difference between the second and third pinnules is more marked. Those of the type specimens are sometimes nearly equal, though not always so; but in the Mergui form the difference is often considerable (Pl. XXVII. figs. 1, 2); it is not so great, however, as in *Antedon protecta*, in which the third pinnule is much reduced in size, not only on the inner, but also on the outer arms.

ACTINOMETRA NOTATA, sp. n. (Plate XXVI. figs. 6-12.)

Specific Formula. A. R. $\frac{d. p. p'. (p'')}{2} \cdot \frac{br. bc}{b}$.

Centro-dorsal a thick disk, bearing 30 or 35 marginal cirri. These have about 25 joints, the later ones short and wide, with but little trace of spines.

First radials more or less concealed; the two outer ones united by syzygy. Arms 31 to 50 or more in number. The distichal and palmar series each of two joints united by syzygy, with one or two further divisions of the same character; the first two brachials also united by syzygy. The next syzygy is sometimes in the third or fourth, but usually not till the tenth or fifteenth brachial, and others follow at intervals of 2-4 joints. The lowest brachials are nearly oblong, and their successors triangular and wider than long, soon becoming more quadrate, and finally nearly oblong again.

The first pinnule is on the second brachial, and is very long and flagellate with a large terminal comb, reaching nearly 40 millim. on the outside of the ray. The following pinnules diminish rather rapidly in length, and lose their comb after about the eighth brachial, but never become specially short. The two basal joints of the first three or four pinnules on each side are more or less carinate.

Mouth obscurely radial; the disk may have calcareous granules in the anal interradius, or be entirely naked. All the arms are grooved.

Colour in spirit, dark blackish brown.

Disk 30 millim. ; spread 25 centim.

Habitat. King Island ; sublittoral. Three specimens.

Remarks. This fine species exhibits the same peculiarities of the rays and their subdivisions as are characteristic of *Actinometra paucicirra* ; but whereas the presence of palmar series is an exception in *A. paucicirra*, so that the number of arms is limited to twenty, palmars are always present in *A. notata*. Furthermore, they may be followed by one or even by two post-palmar series (Pl. XXVI. fig. 7), and the number of arms therefore is sometimes twice as great as in *Actinometra paucicirra*. In the latter species, too, which normally has but four arms to the ray, the two outer arms generally have a syzygy in the third brachial ; but in *A. notata*, with six to twelve arms on the ray, this character occurs but rarely (Pl. XXVI. fig. 6). The latter species is further distinguished from *A. paucicirra*, which has no cirri in the adult condition, by the large size of the centro-dorsal, and its numerous and well-developed cirri (Pl. XXVI. figs. 11, 12). It would seem, however, that the centro-dorsal of *A. notata* undergoes a certain amount of retromorphosis before reaching maturity ; for it is relatively largest in the youngest individual (Pl. XXVI. fig. 8), partly concealing the second radials, which are united laterally, and its dorsal surface, though flat, is not hollowed in any way. In the two adult individuals, however, portions of the first radials are visible, in one case a considerable amount (Pl. XXVI. fig. 7), while the dorsal surface of the centro-dorsal is distinctly hollowed.

The disk of the youngest individual is entirely naked ; while those of the two larger forms bear well marked calcareous granules in the anal interradius. The arrangement of the ambulacra in one of them is very singular (Pl. XXVI. fig. 6). The mouth seems to be radial, and the number of groove-trunks connected with the peristome is very considerable. The aboral portion of the left antero-lateral ray B^2 , which includes the arms borne upon its posterior distichal axillary, has an altogether abnormal groove-supply. The ambulacra of its anterior arms (b^3) are directly connected with the peristome, as is often the case ; one would therefore expect to find those of its posterior arms, b^4 , supplied by a branch of the single primary ambulacrum, which in the ordinary species of *Actinometra* passes round the disk to reach the left postero-lateral ray (see woodcut). In the specimen before me, however, the ambulacrum proceeding in this direction from the left posterior

angle of the peristome comes to a sudden end on the disk, immediately after its first bifurcation; and all the ambulacral grooves

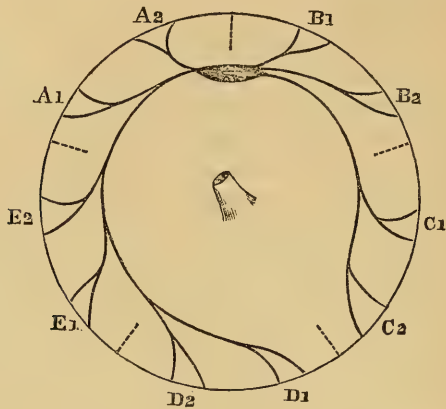


Diagram of the disk of a normal *Actinometra*, with interradial mouth*.

The dotted lines mark the interambulacral regions of the disk. $A_1 A_2 E_1 E_2$ the five pairs of secondary ambulacra.

of the corresponding ray (C) together with those of the distal arms on the B ray (b^4) are connected with the single groove-trunk, which comes round the right side of the disk to supply the hinder arms of the D ray (Pl. XXVI. fig. 6). I cannot account in any way for this abnormal arrangement, which does not appear to be accidental, at any rate so far as the union of the right and left posterior ambulacra is concerned (C^2 and D^1). But it is just possible that the parasitic growths which appear upon some of the brachial ambulacra may have also shown themselves on the disk, and have destroyed the connection between the primary groove-trunk of the left posterior ray and its peripheral branches, a connection which was not fully restored by the regeneration of that part of the disk. But I imagine that it would be going too far to assume that the connection between C^2 and D^1 ambulacra arose in consequence of this loss; for there are so many cases in which a large proportion of the hinder arms of an *Actinometra* are entirely devoid of ambulacra, that there would not seem to be any absolute necessity for the isolated poste-

* From the Report on the 'Challenger' Comatulæ, by kind permission of the Editor, Dr. John Murray.

rior arms in this individual being brought into communication with the peristome.

It would be interesting to learn to what extent these arms are isolated; whether, for example, the water-vessel continues onward in its normal course, although there is no ambulacrum above it. I think it not improbable that such might be the case, as it certainly is so in the ungrooved and non-tentaculiferous arms of several species.

The parasitic growths to which I have referred above are of a very singular character. They only present themselves upon this one individual, and occur along some of the brachial ambulacra, blocking them more or less completely. Some of them have been removed and sent to Professor von Graff, who will report upon them separately.

DESCRIPTION OF THE PLATES.

PLATE XXVI.

Figs. 1-5. *Antedon Andersoni*, sp. n.

- Fig. 1. Dorsal view of the calyx and arm-bases, $\times 2$.
 2. Side view of the second and following brachials, with their pinnules, $\times 2$.
 3. Side view of the lower part of an arm, $\times 2$.
 4. Portion of a brachial ambulacrum, as seen after removal of the pinnules, $\times 4$.
 5. The same, with one pinnule *in situ*, $\times 4$.

Figs. 6-10. *Actinometra notata*, sp. n.

- Fig. 6. A disk, with abnormally distributed ambulacra, $\times 1\frac{1}{2}$.
 7. Dorsal aspect of the adjacent portions of two rays in an adult individual, $\times 2$.
 8. Dorsal aspect of the calyx and arm-bases in an immature specimen, $\times 2$.
 9. Dorsal view of the middle part of an arm, $\times 2$.
 10. Side view of the second and following brachials, with their pinnules, $\times 2$.
 11. A cirrus, $\times 2$.
 12. Another, less mature, $\times 2$.

PLATE XXVII.

Figs. 1, 2. *Antedon conjungens*, Carpenter.

- Fig. 1. Side view of the second and following brachials in the outer arm of a distichium, with their pinnules, $\times 3$.
 2. The same part of an inner arm, $\times 3$.

Figs. 3-5. *Antedon spicata*, Carpenter.

Fig. 3. Side view of the second and following brachials, with their pinnules ; the second pair of pinnules have their ends broken away. $\times 3$.

4. A cirrus, $\times 3$.

5. Dorsal view of the middle part of an arm, $\times 3$.

Figs. 6, 7. *Antedon Milberti*, Müll., sp.

Fig. 6. Side view of the second and following brachials, with their pinnules, $\times 2$.

7. The same, from another individual, $\times 2$.

Fig. 8. *Antedon Andersoni*, sp. n.

Fig. 8. A cirrus, $\times 2$.

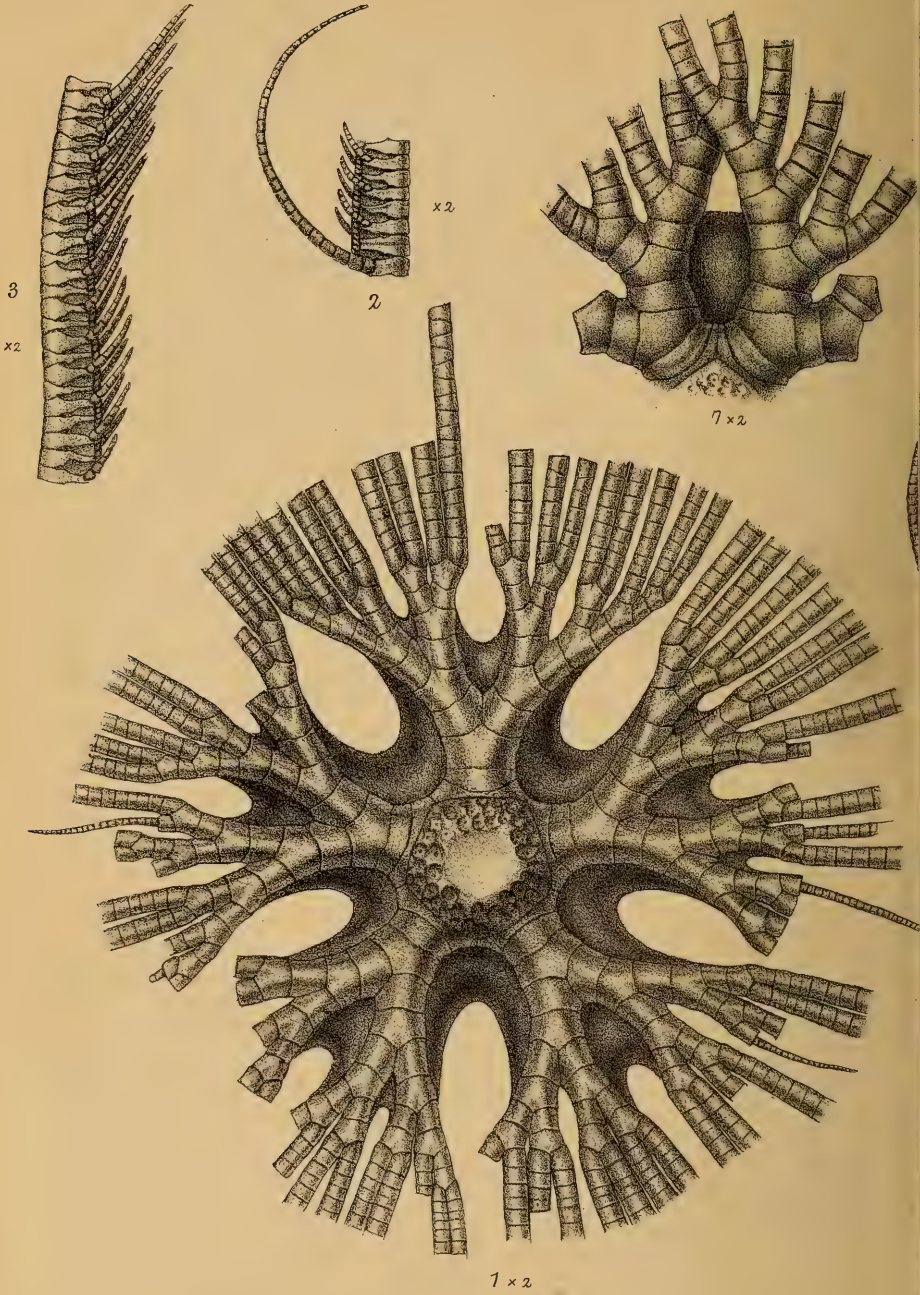
On the Echinoidea of the Mergui Archipelago, collected for the Trustees of the Indian Museum, Calcutta, by Dr. John Anderson, F.R.S., Superintendent of the Museum. By Prof. P. MARTIN DUNCAN, M.B. (Lond.), F.R.S., F.L.S., and W. PERCY SLADEN, F.G.S., Sec. L.S.

[Read 21st June, 1888.]

THE Echinoidea collected by Dr. Anderson are represented by six species; and although these are all known forms their association in such a limited area is remarkable, and, so far as we are aware, without precedent. The fact that all the regular Echinids belong to the family Temnopleuridæ is especially striking; and the circumstance is the more noteworthy, as in a collection from the Andaman Islands, described last year by Prof. Jeffrey Bell, not a single Temnopleurid is recorded; and, furthermore, out of nine genera mentioned by him as occurring at the Andaman Islands, not one is represented in the collection placed in our hands from the Mergui Archipelago.

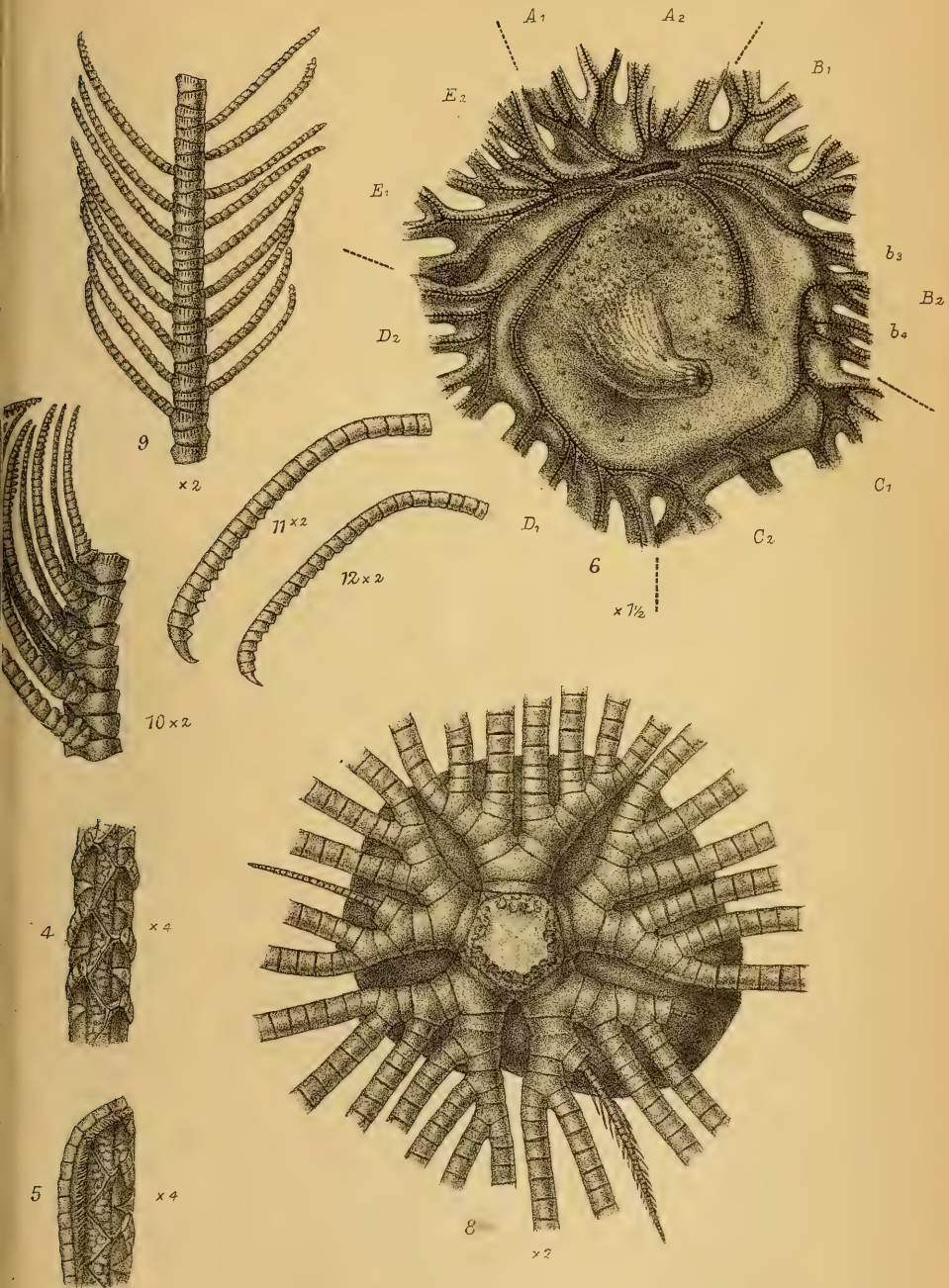
All the species, with the exception of one, are essentially Indian-Ocean forms; the majority of the examples, however, present a certain amount of variation when compared with specimens from other localities which is sufficient to impart a local character. These differences are recorded in the following notes; but we have not thought them of sufficient importance to warrant in any case their recognition by name as a definite variety.

Carpenter.



Berjeau & Highley, del. et lith.

1-5, ANTEDON
6-10, ACTINOMET

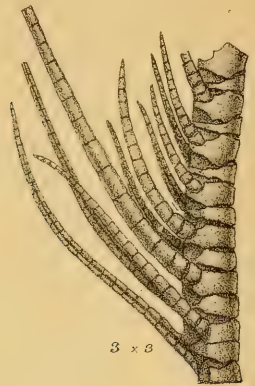




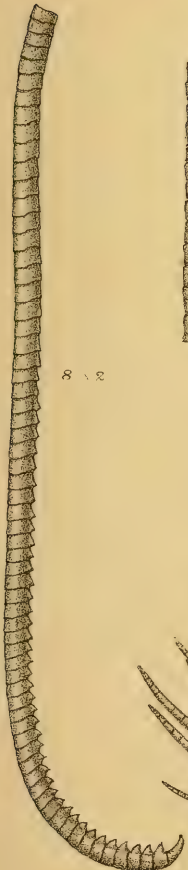
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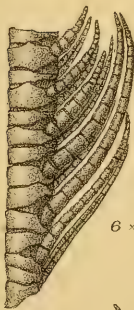
2 x 3



3 x 3



4 x 2



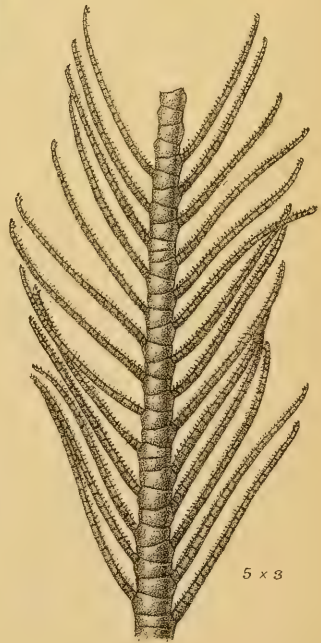
5 x 2



6 x 3



7 x 2



8 x 3

Berjeau & Hignley del. et lith.

West, Newman & Co. imp.

1, 2. *ANTEDON CONJUGENS*, Carp

3-5, *A. SPICATA*, Carp. 6, 7. *A. MILBERTI*, Mill., sp. 8. *A. ANDERSONI*, sp. n.